

What is claimed is:

1. In a storage system for storing data coupled to a computer system having operating system software capable of executing a data recovery program, a method for increasing the effectiveness of restoration of data after a failure comprising:

creating a snapshot of the data stored in a particular storage system to thereby provide a first data image;

using the operating system data recovery program, recovering data associated with the computer system to thereby provide a second data image; and

combining the first data image and the second data image to provide restored data after the failure.

2. A method as in claim 1 wherein the computer system creates more than one snapshot, and the computer system maintains a record of previous snapshots, further comprising maintaining for each such snapshot a record of whether the first data image and the second data image are consistent.

3. A method as in claim 1 wherein the step of creating a snapshot is performed under control of a host system.

4. A method as in claim 1 wherein the step of creating a snapshot is performed under control of the storage system.

5. A method as in claim 1 wherein the step of combining the first data image and the second data image to provide restored data comprises:

exporting the snapshot to a host computer system; and

operating the operating system using the first data image.

6. A method as in claim 1 wherein the step of creating a snapshot is performed a plurality of times and the choice of the snapshot for use in the step of combining the first and the second data images is made by a system administrator.

7. A method as in claim 1 wherein the steps of the method are performed by a snapshot management host.

8. In a storage system for storing data coupled to a computer system having application software capable of executing a data recovery program for that particular

application, a method for increasing the effectiveness of restoration of data after a failure comprising:

creating a snapshot of the data stored in a particular storage system to thereby provide a first data image;

using the data recovery program in the application program, recovering data associated with the computer system to thereby provide a second data image; and

combining the first data image and the second data image to provide restored data after the failure.

9. A method as in claim 8 wherein the step of combining the first data image and the second data image to provide restored data comprises:

exporting the snapshot to a host computer system; and

operating the application program using the first data image.

10. A method as in claim 8 wherein the step of operating the application program is carried out by an agent.

11. A method as in claim 8 wherein the computer system creates more than one snapshot, and the computer system maintains a record of previous snapshots, further comprising maintaining for each such snapshot a record of whether the first data image and the second data image are consistent.

12. A method as in claim 8 wherein the step of creating a snapshot is performed under control of a host system.

13. A method as in claim 8 wherein the step of creating a snapshot is performed under control of the storage system.

14. A method as in claim 1 wherein the step of combining the first data image and the second data image to provide restored data comprises:

exporting the snapshot to a host computer system; and

operating the operating system using the first data image.

15. A method as in claim 8 wherein the step of creating a snapshot is performed a plurality of times and the choice of the snapshot for use in the step of combining the first and the second data images is made by a system administrator.

16. A method as in claim 8 wherein the steps of the method are performed by a snapshot management host.

17. A storage system comprising:
a storage for storing data;
a scheduler for invoking creations of snapshots;
a recovery tool for restoring data from snapshots;
a manager coupled to the scheduler for processing creations of snapshots and coupled to the recovery tool for controlling the restoring of data;
a storage agent coupled to the manager and to the storage for controlling the storage to store and retrieve snapshots; and
at least one of an applications program and a file system program coupled to the manager to allow the manager to invoke one of the applications program and the file system program to cause it to restore data under control of a feature of the one of the applications program and the file system program.

18. A storage system as in claim 17 comprising a storage subsystem coupled to a host, and wherein each of the recovery tool, the manager, the storage agent and the at least one of the applications program and the file system program are included in the host.

19. A storage system as in claim 18 wherein the scheduler is included in the storage subsystem.

20. A storage subsystem adapted to be coupled to a host, the storage subsystem for storing snapshot data indicative of a state of data in such storage subsystem at a given time, and for storing other data related to an application program as of the given time, whereby the snapshot data and the other data may be combined later to restore the storage subsystem to a state indicative of its condition at the given time.

21. A storage subsystem adapted to be coupled to a host, the storage subsystem for storing snapshot data indicative of a state of data in such storage subsystem at a given time, and for storing other data related to an operating system program as of the given time, whereby the snapshot data and the other data may be combined later to restore the storage subsystem to a state indicative of its condition at the given time.